

17. The composition of Claim 1 wherein the C₃₆ fullerene based molecules are endohedrally doped C₃₆ molecules having other atoms trapped therein.

18. The composition of Claim 1 wherein the other atoms are Na, Mg, Ca, Sr, Si, Ge, or Zr.

REMARKS

Claims 1-9 were presented for examination. Claims 1, 4, 5 have been amended. New Claims 10-18 have been added. Reconsideration is respectfully requested.

Claims 1-9 are rejected under 35 USC 112, first paragraph, as containing subject matter not described in the specification in a way to convey possession of the claimed invention. This rejection is respectfully traversed.

The Examiner states that it is not clear that the structure is as alleged, believing that Fig. 5B is more consistent with D_{2d} structure. The Examiner basis his position on a simplistic analysis that the 3 left lines of the D_{2d} structure form the taller peak and the other two lines form the smaller peak. However, the wider left line of the D_{6h} structure provides just as good a basis for the taller peak. Additional data not contained in the application supports the D_{6h} structure.

Furthermore, the exact structure is irrelevant to the claimed subject matter. The mass spectrum of Fig. 3 clearly shows that the material is C₃₆ and that is what is claimed. Applicant is not required to determine the structure of the C₃₆ material. Pages 8-9 merely indicate that there are 15 theoretically possible structures, and that D_{6h} is the

most likely and D2d the next most likely. Additional data supports D6h, but even if the material contains a mix of several structures, or has an unknown structure, the claimed subject matter of C36 material is fully supported.

The Examiner states that 400 torr He is an important factor in C36 production and should be incorporated into Claim 6. This limitation is a specific detail of one particular embodiment of making C36 and is contained in dependent Claim 7. Claim 6 is a more generic claim to making C36 rich soot and separating the C36. The methods of making graphite arc soot are known, and in light of Applicant's disclosure, one skilled in the art can routinely adjust process parameters such as pressure to enhance C36 production.

Therefore it is submitted that the rejection is obviated.

Claims 1-9 are rejected under 35 USC 112, second paragraph as indefinite, for the following reasons and with the accompanying response.

The Examiner states that in Claim 1, "formed of" is unclear as open language that reads on naturally occurring fullerenes. It is clear that Applicant has produced an isolated purified form of C36 that is not naturally occurring, e.g. see Fig. 3. Although "formed of" is believed to have a natural meaning of "made of" Claim 1 has been amended using "consisting essentially of" so that it is clear that the material is C36.

The Examiner states that in Claim 6, "producing" is unclear as to the required steps. The Examiner appears to be confusing breadth with indefiniteness. "Producing" is definite. It is a broad term like "making" or "forming." Claim 6 recites that a C36 rich graphite arc soot is made or produced. Thus the step is already specific in that it is a graphite arc process that is well known in making fullerenes. The specification further describes a specific method in which He pressure is a control variable. Claim 6 then

recites producing a solid material, e.g. film or powder as stated on page 3, lines 19-20, from the isolated C36. One can easily determine if a particular method falls within the claim. Is C36 rich soot produced, by any method? Is a solid material formed by any method from C36 isolated from the soot? If both of these occur, then they fall under the claim. If they do not occur, they are outside the claim. Thus the claim is definite since the scope of its coverage can be easily determined.

The Examiner states that in Claim 5, "thin hard" are subjective. These adjectives have been deleted.

The Examiner states that in Claim 4 it is not clear as to what the molecules are bonded. The Examiner is of course correct that they are bonded to each other. Nothing else makes any sense. However, the phrase "to each other" has been added for clarity.

Accordingly it is submitted that the rejection is obviated.

Claims 1-5 are rejected under 35 USC 102(b) or 103(a) over Stankevich. The Examiner states that Stankevich teaches C36 on p. 172 and that "As its properties are reported, it appears to have been made and isolated." This rejection is respectfully traversed.

The Examiner is clearly in error in his characterization of Stankevich. The paper is a purely theoretical paper, with no measured properties reported, and no evidence that C36 was made or isolated. The Abstract states that carbon cluster structures were studied by "topological and valence approaches" which are theoretical methods as clearly shown on p. 170-171. The first three lines of p. 169 state that cited work "stimulates further modeling of various carbon cluster structures and prognosis of their properties." Thus the

values given in Table 1 on p. 172 are purely theoretical calculations. There is no suggestion of forming coatings as in Claim 5. Therefore the rejection is obviated.

Claim 1 has been amended to include C36 fullerene based molecules as well as the C36 fullerene molecules. These additional materials are derived from the basic C36 molecules and are described at p.3, line 21 to p. 4, line 7, and under heading D. Properties and Related Compounds on p. 11-12. There are three general types, C36 compounds, substitutionally doped C36 and endohedrally doped C36. New Claims 11-18 are directed to these materials. New Claim 10 is directed to the film or powder form of the C36 material, as on p. 3, lines 19-20. Thus no new matter has been added.

It is noted that Claims 6-9 are not rejected on art.

Accordingly it is submitted that all claims now pending in the case are in condition for allowance which is earnestly solicited. If any impediment should remain which can be resolved by telephone, please call Applicant's Attorney at (510) 486-4534.

Respectfully submitted,

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APPENDIX

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Version with markings to show changes.

IN THE CLAIMS:

Claim 1 is amended as follows:

1. (Amended) A composition of matter comprising a solid state material [formed]
consisting essentially of C₃₆ fullerene molecules or C₃₆ fullerene based molecules.

Claim 4 is amended as follows:

4. (Amended) The composition of Claim 1 wherein the molecules are covalently
bonded to each other.

Claim 5 is amended as follows:

5. (Amended) An article of manufacture comprising a [thin hard] coating formed
of a solid state C₃₆ material.

New Claims 10-18 are added:

10. The composition of Claim 1 wherein the solid state material is in the form of
a film or a powder.

11. The composition of Claim 1 wherein the C₃₆ fullerene based molecules are
C₃₆ compounds having other atoms attached to some carbon atoms of the C₃₆ molecules.

12. The composition of Claim 11 wherein the other atoms are halogens.

13. The composition of Claim 12 wherein the halogen is F or Cl.
14. The composition of Claim 1 wherein the C₃₆ fullerene based molecules are substitutionally doped C₃₆ molecules having substituent atoms in place of some carbon atoms.
15. The composition of Claim 14 wherein the substitutionally doped C₃₆ molecules have the formula C₃₆-aX_a where X is the doping atom and $0 < a \leq 12$.
16. The composition of Claim 15 wherein X is N or B.
17. The composition of Claim 1 wherein the C₃₆ fullerene based molecules are endohedrally doped C₃₆ molecules having other atoms trapped therein.
18. The composition of Claim 1 wherein the other atoms are Na, Mg, Ca, Sr, Si, Ge, or Zr.